

CLAIMS:

What is claimed is:

1. A system for tracking missing packets at a receiving terminal of a network transmission comprising:
 - processing logic;
 - a memory in which incoming packets and a tracking array are stored;
 - means for determining a maximum number N , corresponding to the number of sequentially numbered spaces within said tracking array utilized for tracking said incoming packets;
 - means for receiving an incoming packet and identifying a sequence number, M , of said incoming packet;
 - means, responsive to receipt of a packet with sequence number, M , that is greater than a current maximum number that may be tracked by said tracking array, for compressing spaces within said tracking array in multiples of X , where X is an integer, and N is a multiple of X , to create an array of N group values, wherein each group value indicates whether or not each packet within a particular group of packets assigned to a particular array space was received, wherein a number of packets within said particular group is initially 1 and increases by a factor of X after each compression; and
 - means for setting a value of said particular array space of said tracking array to a first value indicating receipt of all packets within said particular group of packets, wherein said value is set to a second value when all of said packets within said particular group of packets have not been received.

1 2. The system of Claim 1, further comprising:

2 means, responsive to a receipt of a final packet of a file being transmitted, for
3 checking said array for occurrence of holes, each hole representing that at least one
4 packet within a group was not received; and

5 means for issuing a request for each packet within a group whose array space
6 contains a hole, wherein an entire group is re-requested when said hole is found.

1 3. The system of Claim 1, wherein:

2 Y packets are received at a time by said receiving terminal, where Y is an integer
3 with value greater than 1, and said Y packets may be received out of sequential order
4 with respect to each other;

5 said system further comprising:

6 means for tracking each packet in a buffered storage area comprising a current
7 group and at least one previous group, wherein each of said received packets are sorted
8 into their respective groups before a received status of a group corresponding to the
9 received packets is recorded within the array.

1 4. The system of Claim 3, wherein said tracking means further comprises:

2 means, responsive to a packet being in said at least one previous group or said
3 current group, for respectively updating a status of said previous group or said current
4 group within said buffer.

1 5. The system of Claim 4, wherein, responsive to all packets of a group being
2 received, said system further comprises:

3 means for updating a received status of said group within said array to indicate
4 receipt of said group; and

5 means for moving said group out of said buffer.

1 6. The system of Claim 5, wherein said group is a previous group, said system
2 further comprising:

3 means for identifying said current group as a previous group, wherein a next
4 group is selected as the current group; and

5 means, when a final packet has not been received, for subsequently tracking
6 packets for said next current group within said buffer.

1 7. The system of Claim 5, wherein said updating step further comprises:

2 means, responsive to a receipt of a new packet not within said current group or
3 said at least one previous group, for moving a first created previous group out of said
4 buffer; and

5 means for updating a received status of said first created previous group within
6 said array to indicate non-receipt of each packet of said first created previous group.

1 8. The system of Claim 7, wherein N is a multiple of 2, X is 2 and L is the number
2 of packets in a current group, said system further comprising means for determining a
3 group space, P, of a received packet by dividing said sequence number, M, of said packet
4 by L, wherein a sum of a resulting quotient of said division + 1 indicates the group space
5 within the array and a remainder of said division indicates the position of the received
6 packet within the particular group.

1 9. The system of Claim 1, said compression means further comprising means for
2 ANDing each value within X adjacent spaces of said array to create a first set of group
3 values stored within a first section of said array, wherein a second set of group values are
4 determined when packets within subsequent groups are received after the compression
5 and stored in a second section of said array.

1 10. A computer program product comprising:
2 a computer readable medium; and
3 program code on said computer readable medium for tracking missing packets
4 at a receiving terminal of a network transmission, said program code including code for:
5 determining a maximum number N, corresponding to the number of sequentially
6 numbered spaces within said tracking array utilized for tracking said incoming packets;
7 receiving an incoming packet and identifying a sequence number, M, of said
8 incoming packet;
9 responsive to receipt of a packet with sequence number, M, that is greater than
10 a current maximum number that may be tracked by said tracking array, compressing
11 spaces within said tracking array in multiples of X, where X is an integer, and N is a
12 multiple of X, to create an array of N group values, wherein each group value indicates
13 whether or not each packet within a particular group of packets assigned to a particular
14 array space was received, wherein a number of packets within said particular group is
15 initially 1 and increases by a factor of X after each compression; and
16 setting a value of said particular array space of said tracking array to a first value
17 indicating receipt of all packets within said particular group of packets, wherein said
18 value is set to a second value when all of said packets within said particular group of
19 packets have not been received.

1 11. The computer program product of Claim 10, further comprising program code
2 for:
3 responsive to a receipt of a final packet of a file being transmitted, checking said
4 array for occurrence of holes, each hole representing that at least one packet within a
5 group was not received; and
6 issuing a request for each packet within a group whose array space contains a
7 hole, wherein an entire group is re-requested when said hole is found.

12. The computer program product of Claim 10, wherein:

Y packets are received at a time by said receiving terminal, where Y is an integer with value greater than 1, and said Y packets may be received out of sequential order with respect to each other;

said computer program product further comprising program code for:

tracking each packet in a buffered storage area comprising a current group and at least one previous group, wherein each of said received packets are sorted into their respective groups before a received status of a group corresponding to the received packets is recorded within the array.

13. The computer program product of Claim 12, wherein said program code for tracking further comprises program code for:

responsive to a packet being in said at least one previous group or said current group, respectively updating a status of said previous group or said current group within said buffer.

14. The computer program product of Claim 13, wherein, responsive to all packets of a group being received, said computer program product further comprises program code for:

updating a received status of said group within said array to indicate receipt of said group; and

moving said group out of said buffer.

1 15. The computer program product of Claim 14, wherein said group is a previous
2 group, said computer program product further comprising program code for:

3 identifying said current group as a previous group, wherein a next group is
4 selected as the current group; and

5 when a final packet has not been received, subsequently tracking packets for said
6 next current group within said buffer.

1 16. The computer program product of Claim 14, wherein said program code for
2 updating further comprises program code for:

3 responsive to a receipt of a new packet not within said current group or said at
4 least one previous group, moving a first created previous group out of said buffer; and
5 updating a received status of said first created previous group within said array
6 to indicate non-receipt of each packet of said first created previous group.

1 17. The computer program product of Claim 16, wherein N is a multiple of 2, X is
2 2 and L is the number of packets in a current group, said computer program product
3 further comprising program code for determining a group space, P, of a received packet
4 by dividing said sequence number, M, of said packet by L, wherein a sum of a resulting
5 quotient of said division + 1 indicates the group space within the array and a remainder
6 of said division indicates the position of the received packet within the particular group.

1 18. The computer program product of Claim 10, said program code for compressing
2 said array further comprises code for ANDing each value within X adjacent spaces of
3 said array to create a first set of group values stored within a first section of said array,
4 wherein a second set of group values are determined when packets within subsequent
5 groups are received after the compression and stored in a second section of said array.

- 1 19. A communication network comprising:
2 a transmitting agent that transmits a file as a plurality of sequentially numbered
3 packets; and
4 at least one receiving agent that receives said packet, wherein said receiving agent
5 comprises:
6 processing logic;
7 a memory in which incoming packets and a tracking array are stored;
8 means for determining a maximum number N , corresponding to the
9 number of sequentially numbered spaces within said tracking array utilized for
10 tracking said incoming packets;
11 means for receiving an incoming packet and identifying a sequence
12 number, M , of said incoming packet;
13 means, responsive to receipt of a packet with sequence number, M , that
14 is greater than a current maximum number that may be tracked by said tracking
15 array, for compressing spaces within said tracking array in multiples of X , where
16 X is an integer, and N is a multiple of X , to create an array of N group values,
17 wherein each group value indicates whether or not each packet within a particular
18 group of packets assigned to a particular array space was received, wherein a
19 number of packets within said particular group is initially 1 and increases by a
20 factor of X after each compression; and
21 means for setting a value of said particular array space of said tracking
22 array to a first value indicating receipt of all packets within said particular group
23 of packets, wherein said value is set to a second value when all of said packets
24 within said particular group of packets have not been received.

1 20. The communication network of Claim 19, further comprising:
2 means, responsive to a receipt of a final packet of a file being transmitted, for
3 checking said array for occurrence of holes, each hole representing that at least one
4 packet within a group was not received; and
5 means for issuing a request for each packet within a group whose array space
6 contains a hole, wherein an entire group is re-requested when said hole is found.

1 21. The communication network of Claim 19, wherein:
2 Y packets are received at a time by said receiving terminal, where Y is an integer
3 with value greater than 1, and said Y packets may be received out of sequential order
4 with respect to each other;

5 said communication network further comprising:

6 means for tracking each packet in a buffered storage area comprising a
7 current group and at least one previous group, wherein each of said received
8 packets are sorted into their respective groups before a received status of a group
9 corresponding to the received packets is recorded within the array.

1 22. The communication network of Claim 21, wherein said tracking means further
2 comprises:

3 means, responsive to a packet being in said at least one previous group or said
4 current group, for respectively updating a status of said previous group or said current
5 group within said buffer.

1 23. The communication network of Claim 22, wherein, responsive to all packets of
2 a group being received, said communication network further comprises:

3 means for updating a received status of said group within said array to indicate
4 receipt of said group; and

5 means for moving said group out of said buffer.

1 24. The communication network of Claim 23, wherein said group is a previous group,
2 said communication network further comprising:

3 means for identifying said current group as a previous group, wherein a next
4 group is selected as the current group; and

5 means, when a final packet has not been received, for subsequently tracking
6 packets for said next current group within said buffer.

1 25. The communication network of Claim 23, wherein said updating means further
2 comprises:

3 means, responsive to a receipt of a new packet not within said current group or
4 said at least one previous group, for moving a first created previous group out of said
5 buffer; and

6 means for updating a received status of said first created previous group within
7 said array to indicate non-receipt of each packet of said first created previous group.

1 26. The communication network of Claim 25, wherein N is a multiple of 2, X is 2
2 and L is the number of packets in a current group, said communication network further
3 comprising:

4 means for determining a group space, P, of a received packet by dividing said
5 sequence number, M, of said packet by L, wherein a sum of a resulting quotient of said
6 division + 1 indicates the group space within the array and a remainder of said division
7 indicates the position of the received packet within the particular group.

1 27. The communication network of Claim 19, wherein said network supports
2 multicast transmission.

1 28. The communication network of Claim 19, wherein said compression means
2 further comprises means for ANDing each value within X adjacent spaces of said array

3 to create a first set of group values stored within a first section of said array, wherein a
4 second set of group values are determined when packets within subsequent groups are
5 received after the compression and stored in a second section of said array.

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